## WHAT IS CLAIMED IS:

- 1. A method for sensing a temperature of a device, that comprises:
  - establishing a programmable current for an on-chip current source;
  - sensing a temperature-dependant voltage that is based on a temperature dependent resistive device and the programmable current, wherein the temperature dependent resistive device is thermally coupled to the device;
  - converting the temperature-dependant voltage to a digital value; and
  - equating the digital value to the temperature of the device.
- 2. The method of claim 1 further comprises adjusting the programmable current such that the temperature-dependent voltage is within a predetermined range of values for converting the temperature-dependent voltage into the digital value, wherein the equating of the digital value is further based on the adjusting of the programmable current.
- 3. The method of Claim 1, wherein the temperature dependent resistive device comprises a thermistor.
- 4. The method of claim 1, wherein the equating the digital value to the temperature of the device further comprises determining the temperature of the device from a table relating digital values to temperatures.

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5. The method of claim 1, wherein equating the digital value to the temperature of the off-chip device further comprises calculating the temperature of the off-chip device with a predetermined function wherein the temperature is a function of:

at least one property of the programmable current; a digitized voltage; and

a set of physical properties of the temperature dependent resistive device.

6. The method of Claim 5, wherein:

the temperature dependent resistive device comprises a thermistor; and

the predetermined function comprises the equation:

Temp=[1/((ln(Index/(16\*Ro))/Beta)+0.00336)]-273

wherein:

Temp is the Temperature of the Off-Chip Device in Celsius;

Index is a digital value derived from the
 digitized voltage and the programmable
 current;

Ro is a resistance of the thermistor in KILOOHMS at  $298 \, \mathrm{K}$ 

Beta is a thermistor value.

7. The method of claim 1 further comprises:
increasing the programmable current when the digital
value decreases below a lower threshold value; and
decreasing the programmable current when the digital
value increases above an upper threshold value.

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- 8. The method of Claim 1, wherein the off-chip device comprises at least one of:

  a hard drive and a battery.
- 9. The method of Claim 8 further comprises, when the device is a battery, controlling a battery charge function based on the temperature of the battery.
- 10. The method of Claim 8 further comprises, when the device is a harddrive, controlling the harddrive based on the temperature of the harddrive.
  - 11. The method of Claim 1, that further comprises: multiplexing the programmable current to a plurality of temperature dependent resistive devices coupled to a plurality of off-chip and/or on-chip devices;
    - measuring a voltage associated with each of the plurality of temperature dependent resistive devices coupled to the plurality of off-chip and/or on-chip devices;
    - converting each temperature-dependant voltage to a digital value; and
    - equating each digital value to the temperature of each of the plurality of off-chip and/or on-chip devices.

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- 12. A digital thermometer to measure a temperature of an off-chip device that comprises:
  - an on-chip programmable current source to provide a
     current output;
  - an analog-to-digital converter operably coupled to sample a temperature-dependent voltage output produced by a temperature dependent resistive device and the current output and convert the temperature-dependent voltage output to a digital value; and
  - a processing module that receives the digital value and equates the digital value to the temperature of the off-chip device.
- 13. The digital thermometer of Claim 12, wherein the processing module directs the on-chip programmable current source to:

increase the current output if the digital value decreases below a lower threshold value; and decrease the current output if the digital value increases above an upper threshold value.

- 14. The digital thermometer of Claim 12, wherein the analog-to-digital converter comprises a comparator.
- 15. The digital thermometer of Claim 12, wherein the processing module auto-ranges the on-chip programmable current source so that the current output produces the temperature-dependent voltage output within a predetermined range.

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- 16. The digital thermometer of Claim 12, that further comprises:
  - a multiplexer that multiplexes the current output to a plurality of temperature dependent resistive devices coupled to a plurality of off-chip and/or on-chip devices; and
  - a demultiplexer that demultiplexes a plurality of temperature-dependant voltages to the analog-to-digital converter,
  - wherein the analog-to-digital converter converts each temperature-dependant voltage to a digital value; and
  - wherein the processing module equates each digital value to the temperature of each of the plurality of off-chip and/or on-chip devices.
- 17. The digital thermometer of Claim 12, wherein the temperature dependent resistive device comprises a thermistor.
- 18. The digital thermometer of Claim 12, wherein the processing module equates the digital value to the temperature of the off-chip device with a table relating digital values to temperatures.

- 19. The digital thermometer of Claim 12, wherein the processing module equates the digital value to the temperature of the off-chip device by calculating the temperature of the off-chip device with a predetermined function wherein the temperature is a function of:
  - a current supplied by the on-chip current source;
  - a digitized voltage; and
  - a set of physical properties that define the temperature dependent resistive device.

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- 20. The digital thermometer of Claim 12, wherein:
  - the temperature dependent resistive device comprises a thermistor; and
  - the predetermined function comprises the equation: Temp=[1/((ln(Index/(16\*Ro))/Beta)+0.00336)]-273

wherein:

- Temp is the Temperature of the Off-Chip Device in Celsius;
- Index is a digital value derived from the
   digitized voltage and the programmable
   current;
- Ro is a resistance of the thermistor in KILOOHMS at 298K; and
- Beta is a thermistor value.

- 21. The digital thermometer of Claim 12, wherein the offchip device comprises a hard drive.
- 22. The digital thermometer of Claim 12, wherein the off-30 chip device comprises a battery.

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- 23. The digital thermometer of Claim 12, wherein the processing module controls a function of the off-chip device based on the temperature of the off-chip device.
- 24. The digital thermometer of Claim 12, is located on an audio processing chip.
  - 25. An audio processing chip, having a digital thermometer located thereon to measure a temperature of an off-chip device, that comprises:
    - an on-chip programmable current source to provide a
       current output;
    - a temperature dependent resistive device thermally coupled to the off-chip device, that receives the current output to produce a temperature-dependent voltage output;
    - an analog-to-digital converter to sample the
      temperature-dependent voltage output and convert
      the temperature-dependent voltage output to a
      digital value; and
    - a processing module that receives the digital value and equates the digital value to the temperature of the off-chip device.

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26. The audio processing chip of Claim 25, wherein the processing module directs the on-chip programmable current source to:

increase the current output if the digital value decreases below a lower threshold value; and decrease the current output if the digital value increases above an upper threshold value.

- 27. The audio processing chip of Claim 25, wherein the analog-to-digital converter comprises a comparator.
- 28. The audio processing chip of Claim 25, wherein the processing module auto-ranges the on-chip programmable current source so that the current output produces the temperature-dependent voltage output within a predetermined range.
- 29. The audio processing chip of Claim 25, that further comprises:
  - a multiplexer that multiplexes the current output to a plurality of temperature dependent resistive devices coupled to a plurality of off-chip and/or on-chip devices; and
  - a demultiplexer that demultiplexes a plurality of temperature-dependant voltages to the analog-to-digital converter,
  - wherein the analog-to-digital converter converts each temperature-dependant voltage to a digital value; and
  - wherein the processing module equates each digital value to the temperature of each of the plurality of off-chip and/or on-chip devices.

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- 30. The audio processing chip of Claim 25, wherein the temperature dependent resistive device comprises a thermistor.
- 31. The audio processing chip of Claim 25, wherein the processing module equates the digital value to the temperature of the off-chip device with a table relating digital values to temperatures.
- 32. The audio processing chip of Claim 25, wherein the processing module equates the digital value to the temperature of the off-chip device by calculating the temperature of the off-chip device with a predetermined function wherein the temperature is a function of:
  - a current supplied by the on-chip current source;
  - a digitized voltage; and
  - a set of physical properties that define the temperature dependent resistive device.
  - 33. The audio processing chip of Claim 25, wherein: the temperature dependent resistive device comprises a thermistor; and
    - the predetermined function comprises the equation:

      Temp=[1/((ln(Index/(16\*Ro))/Beta)+0.00336)]-273

      wherein:
      - Temp is the Temperature of the Off-Chip Device in Celsius;
      - Index is a digital value derived from the
         digitized voltage and the programmable
         current;
      - Ro is a resistance of the thermistor in KILOOHMS at 298K; and
      - Beta is a thermistor value.

- 34. The audio processing chip of Claim 25, wherein the off-chip device comprises a hard drive.
- 5 35. The audio processing chip of Claim 25, wherein the offchip device comprises a battery.
- 36. The audio processing chip of Claim 25, wherein the processing module controls a function of the off-chip device based on the temperature of the off-chip device.